

Serial No. 09/468,471

PATENT
PA060-USREMARKS/ARGUMENTS

Claims 41-50, 52-55, and 68-78 are pending in the application. Reexamination and reconsideration of the application are respectfully requested.

Claim Rejections Under 35 U.S.C. § 102:

Claims 41-45, 47, 48, 52-55, 68, 69 and 75-77 are rejected under 35 U.S.C. § 102(b) as being anticipated by Love, U.S. Patent No. 3,142,296 ('296). This rejection is respectfully traversed.

The present invention is directed to methods for forming gas-enriched fluids, in general, and methods for blood oxygenation, in particular. In the methods of the present invention, a first fluid (such as blood) is enriched with a gas as a result of its convective mixing with a second gas-saturated fluid and a liquid-to-liquid gas diffusion (page 21, lines 5-10). It is an unexpected discovery of the inventors that the liquid-to-liquid approach to enriching a fluid with a gas is rapid and efficient. It is also a discovery of the inventors that the most effective and complete mixing of the two fluids and the liquid-to-liquid gas transfer therebetween is achieved when the fluid being enriched with the gas flows vortically in the mixing chamber. Also, the inventors have discovered that liquid-to-liquid oxygenation methods of the present invention avoid formation of clinically significant bubbles (page 42, lines 1-9). Accordingly, the independent method claims 41 and 68 require a step of mixing a first fluid (such as blood) flowing vortically with a second fluid, which is supersaturated with gas.

The '296 patent does not anticipate independent claims 41 and 68 because it does not teach a liquid-to-liquid oxygenation achieved by mixing a first fluid with a gas-supersaturated fluid within a mixing chamber. Instead, the '296 patent describes a conventional gas-to-liquid oxygenation of blood by filming it on a dome of a container and sweeping the film by oxygen-rich gas (column 1, lines 33-36).

The '296 patent does not make the instant claims 41 and 68 obvious. As discussed above, in the present invention, a fluid (such as blood) is enriched with a gas as a result of its mixing with a

Serial No. 09/468,471

PATENT
PA060-US

gas-supersaturated fluid, which leads to a liquid-to-liquid gas diffusion. The vortical flow of the first fluid serves to promote mixing of the two fluids (page 21, lines 20-23).

The '296 patent has no teaching whatsoever of oxygenating a fluid by contacting it with an oxygen-supersaturated fluid, much less of the specific methods of claims 41 and 68. Instead, the '296 patent describes enriching an oxygen-poor blood with oxygen by mixing it with an oxygen-rich gas (column 1, lines 33-36, column 3, lines 21-25, and claim 1). In the '296 patent, the blood is directed upwardly to produce a film of blood to facilitate a diffusion of oxygen contained in an oxygen-rich gas into the blood (column 3, lines 21-25). Since the present invention provides unexpected advantages by utilizing a liquid-to-liquid gas transfer, the '296 patent does not make the present invention obvious by describing a direct blood oxygenation by an oxygen-rich gas.

Therefore, claims 41 and 68 are neither anticipated nor are rendered obvious by the '296 patent. Claims 42-45, 47, 48, 52-55, 68, 69, and 75-77 depend from claims 41 and 68 and are patentable over the '296 patent for at least the same reasons as claims 41 and 68.

Claim Rejections Under 35 U.S.C. § 103:

Claims 42-45, 48, 49, 50, 70-74, and 78 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the '296 patent in view of Grady, U.S. Patent No. 5,084,011 ('011). This rejection is respectfully traversed.

As discussed above, the independent claims 41 and 68 are patentable over the '296 patent. The '011 patent does not remedy the defects of the '296 patent and is not relied upon by the Examiner for such. The Examiner cites the '011 patent for describing a gas enriched fluid, which may be hyperoxic and hyperbaric. However, the '011 patent does not teach or suggest the liquid-to-liquid oxygenation. Instead, the '011 patent describes a conventional gas-to-liquid oxygenation in which oxygen gas is mixed with the blood. Therefore, claims 41 and 68 are neither anticipated nor are rendered obvious by the '296 and the '011 patents. Claims 49, 50, 70-74 and 78, depend from claims 41 and 68 and are patentable over the '296 patent in view of the '011 patent for at least the same reasons as claims 49 and 68.

Serial No. 09/468,471

PATENT
PA060-US

Claim 46 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the '296 patent in view of Spears, U.S. Patent No. 5,693,017 ('017). This rejection is respectfully traversed.

As discussed above, the independent claim 41 is patentable over the '296 patent. The '017 patent does not remedy the defects of the '296 patent and is not relied upon by the Examiner for such. The Examiner relies on the '017 patent for teaching a saline used as a gas-supersaturated fluid. The '017 patent has no teaching whatsoever of a liquid-to-liquid gas transfer, much less of the specific method of claim 41. Therefore, claim 41 and its dependent claim 46 is patentable over the cited references.

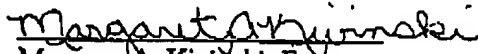
In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the telephone number given below to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1769.

Respectfully submitted,

Date: November 5, 2003


Margaret A. Kivinski, Esq.
Registration No. 38,517
Attorney for Applicant(s)
TherOx, Inc.
2400 Michelson Drive
Irvine, California 92612
Phone: 949-757-1999
Fax: 949-757-1989